OCT-Based Retinal Biomarkers in Parkinson's Disease: Exploring Early Diagnostic and Monitoring Potential

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Background and aims

This study aims to identify retinal alterations across different layers and sectors of the retina, and to investigate their potential use as diagnostic biomarkers, as well as their role in monitoring disease progression.

Materials and methods

Forty-six Parkinson's disease patients were enrolled and classified into tremor-dominant or akinetic-rigid phenotypes. Exclusion criteria included atypical forms, advanced stages, and major ocular/systemic comorbidities. All underwent neurological (UPDRS-III, MoCA) and ophthalmological (OCT) assessments. Retinal layer thickness was compared with an age- and sex-matched control group, with subgroup analyses by phenotype and correlations with Levodopa Equivalent Daily Dose (LEDD)

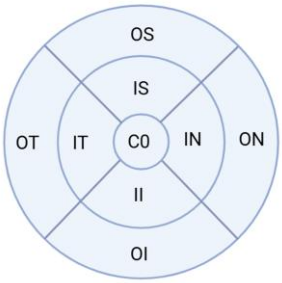
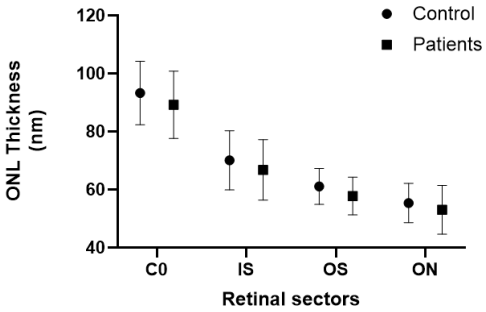


Figure 1. The subdivision system of the macular region as proposed by the ETDRS (Early Treatment Diabetic Retinopathy Study). Images created with BioRender.com

Results

In the macular region, patients with Parkinson's disease showed a reduction in the thickness of the outer nuclear layer (ONL) across several sectors, and a localized increase in retinal pigment epithelium (RPE) thickness in the inner superior (IS) sector. In the peripapillary region, significant alterations were observed only in the inferotemporal (IT) sector. Compared to the tremor-dominant group, patients with the akinetic-rigid phenotype exhibited more pronounced changes in both the macular and peripapillary regions. A negative correlation was also found between LEDD and retinal thickness across all sectors.



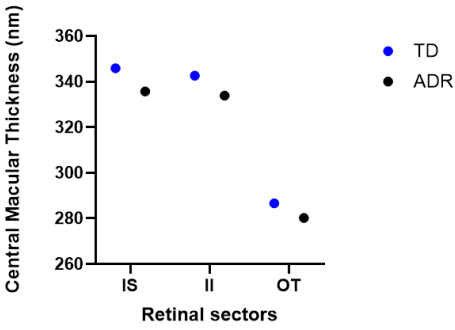


Table 1. Retinal thickness differences: controls vs. patients (above); phenotypes comparison (below) in some retinal sectors.

Conclusions Our findings indicate early involvement of the outer nuclear layer and highlight possible preferentially affected sectors. If confirmed by further research, these retinal changes could support the use of retinal imaging as a biomarker in Parkinson's disease.

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